

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-25 (Canceled)

26. (New) A sol-gel process for the production of nanohybrid sol-gel materials for heterogeneous aerobic catalysis containing tetra-*n*-propylammonium perruthenate (TPAP) entrapped in a sol-gel matrix, comprising hydrolyzing and co-polymerizing organosilanes and silanes in the presence of said TPAP, water, and an organic cosolvent; wherein said co-polymerization is carried out with a precursor fluorinated organosilane and a non-fluorinated silane monomer.

27. (New) The process according to claim 26, wherein said fluorinated organosilane and said silane are in the form of metal alkoxydes.

28. (New) The process according to claim 27, wherein said precursor fluorinated organosilane is a fluorinated silica alkoxide or a fluorinated organosilane.

29. (New) The process according to claim 28, wherein said fluorinated silica alkoxide is a compound of the formula



wherein n is 1, and R represents F or a fluorinated alkyl chain selected from the group

consisting of $\text{CF}_3(\text{CH}_2)_2$, $\text{CF}_3(\text{CF}_2)_7\text{CH}_2\text{CH}_2$, and $\text{CF}_3(\text{CF}_2)_5\text{CH}_2\text{CH}_2$.

30. (New) The process according to claim 28, wherein said fluorinated organosilanes have the formula $\text{RR}'\text{Si}(\text{OCH}_3)_2$; R represents F- or a fluorinated alkyl chain selected from the group consisting of $\text{CF}_3(\text{CH}_2)_2$, $\text{CF}_3(\text{CF}_2)_7\text{CH}_2\text{CH}_2$, and $\text{CF}_3(\text{CF}_2)_5\text{CH}_2\text{CH}_2$; and R' is a non-hydrolyzable substituent organic group.

31. (New) The process according to claim 30, wherein said non-hydrolyzable substituent organic group is CH_3 , CH_3CH_2 , or $\text{CH}_3\text{CH}_2\text{CH}_2$.

32. (New) The process according to claim 26, wherein said non-fluorinated silane monomer is $\text{Si}(\text{OCH}_3)_4$ (TMOS), $\text{Si}(\text{OCH}_2\text{CH}_3)_4$ (TEOS), or a mixture thereof.

33. (New) The process according to claim 26, wherein said cosolvent is methanol, ethanol, propanol, or a combination thereof.

34. (New) The process according to claim 26, wherein the molar ratio (Si:MeOH:H₂O) among the total silica (Si) (fluorinated organosilane + silane), the amount of cosolvent (MeOH), and the amount of water (H₂O), is selected in the range from 1:4:4 to 1:8:8, in particular of 1:8:4.

35. (New) A nanohybrid sol-gel catalytic material, based on silica organically modified and doped with the ruthenium species tetra-n-propylammonium perruthenate (TPAP)

produced via a process as claimed in claim 26.

36. (New) Use of a nanohybrid sol-gel material, based on silica organically modified and doped with the ruthenium species tetra-*n*-propylammonium perruthenate (TPAP) as claimed in claim 35, for use as catalyst having a highly efficient hydrophobic matrix for the selective aerobic oxidation of alcohols to carbonyls with oxygen at atmospheric pressure in a solvent.

37. (New) The use of a material according to claim 36, wherein said solvent is carbon dioxide in supercritical state.

38. (New) The use of a material according to claim 36, wherein said solvent is an organic solvent.

39. (New) The use of a material according to claim 38, wherein said solvent is toluene or dichloromethane.

40. (New) A process for the selective heterogeneous aerobic catalytic oxidation of alcohols to carbonyls in a solvent, comprising employing as catalyst a nanohybrid sol-gel material based on silica organically modified and doped with the ruthenium species tetra-*n*-propylammonium perruthenate (TPAP), as claimed in claim 35, and employing carbon dioxide in supercritical state as solvent.

41. (New) The process according to claim 40, wherein oxygen at atmospheric pressure is employed as primary oxidant.

42. (New) The process according to claim 40, wherein during the catalytic oxidation the temperature of the supercritical carbon dioxide is kept within a range of from 50°C to 120°C at a pressure of from 70 bar to 240 bar, and the partial pressure of the oxygen is kept at a few bars, and in particular in the neighborhood of the value of 1 bar.

43. (New) The process according to claim 40, wherein benzyl alcohol, 1-phenylethanol, cyclohexanol, 1-octanol, or trans-cinnamyl alcohol is oxidized.

44. (New) Nanohybrid sol-gel catalyst for the heterogeneous aerobic catalysis containing tetra-*n*-propylammonium perruthenate (TPAP) entrapped in the sol-gel matrix obtained by a process as claimed in claim 26.

45. (New) Nanohybrid sol-gel catalyst for the heterogeneous aerobic catalysis containing tetra-*n*-propylammonium perruthenate (TPAP) entrapped in the sol-gel matrix obtained by a process as claimed in claim 29.

46. (New) Nanohybrid sol-gel catalyst for the heterogeneous aerobic catalysis containing tetra-*n*-propylammonium perruthenate (TPAP) entrapped in the sol-gel matrix obtained by a process as claimed in claim 30.

47. (New) Nanohybrid sol-gel catalyst for the heterogeneous aerobic catalysis containing tetra-*n*-propylammonium perruthenate (TPAP) entrapped in the sol-gel matrix obtained by a process as claimed in claim 34.